WATER ALLOCATION PROGRAM DEVELOPMENT
STREAMFLOW STANDARDS SUBCOMMITTEE MEETING

MINUTES OF MEETING
May 12, 2003

Present: Alicia Good, Jim Marvel, Ralph Abele, Al Bettencourt, Rich Blodgett, Jim Campbell, Steve Donohue, Eugenia Marks, George Palmisciano, Eugene Pepper, Kathy Crawley, Elizabeth Scott, Alisa Richardson, Chuck Hebert, Theodore Peters, Phil Zarriello

Mr. Marvel opened the meeting. He reviewed the meeting agenda, noting that there would be two presentations followed by group discussion about the presentations and next steps for the group. He introduced the first speaker, Mr. Ralph Abele, Instream flow Coordinator, USEPA.

1. An Overview of the Connecticut Interim and Long-Term Streamflow Approaches Ralph Abele, Instream Flow Coordinator, US EPA

Mr. Abele presented a series of slides reviewing in detail the discussions associated with Connecticut's allocation efforts, specifically the efforts of the technical subcommittee charged with the issue of stream flow standards (Issue #7). Members had received an email copy of the report with the agenda. In addition, the report had been distributed at an earlier meeting of the subcommittee. Highlights of Mr. Abel's presentation appear below. A full copy of the presentation is attached to these minutes.

- The Connecticut group represented diverse interests including water suppliers and had strong technical expertise.
- They developed an interim standard and suggested long term protocol for the final report to the legislature (1/29/03).
- The interim standard is a modified version of the Apse method (Collin Apse wrote a graduate thesis on the topic and later went to work for the Nature Conservancy).
- The Connecticut Subcommittee on Streamflow (Issue #7) recommended the following approach to applying an interim method, with the exception that there is not unanimous agreement that the flow statistics described in Apse (2000) are the most appropriate for addressing items 1 and 2a:

    1. If the site is located in one of the ten unregulated[1] gaged basins analyzed in the Apse (2000) study, use the statistics listed in Table 4 (Attachment A).
    2. If the site is located outside one of the ten Apse (2000) basins
        a. Use monthly statistics from Table 2 (statewide default criteria)

[1] USGS defines regulation as the artificial manipulation of the flow of a stream.

   b. or estimate monthly statistics using natural daily flows generated by rainfall-runoff models or the QPPQ transform (see Appendix E).
   c. or estimate monthly statistics if located within an alternative gaged watershed identified by USGS as being suitably unregulated, and having a sufficiently long-term record.
- Alternatively, scientifically defensible site-specific studies may be conducted to determine ecologically protective flows.
- The proposed long-term protocol considers habitat needs, fish communities and outlines a seven-step process to establish habitat/flow needs from the CT report (See attached section of the report-Attachment B).

Discussion: There were a number of questions about the graphs and how habitat and flow relate. It was noted that the CT report also outlines other ways to reestablish flow beyond flow requirements (p. 8, Attachment B).

Mr. Marvel then introduced Mr. Phil Zarriello, District Surface Water Specialist, Hydrologist, US Geological Survey.

An Overview of the Ipswich HSPF Model. Discussion of management strategies investigated for the Ipswich to meet water demand and maintain adequate flow. Mr. Zarriello stated that the Ipswich was listed as the third most threatened river by a national conservation group last month and in 1997. Highlights of the presentation (attached) include:

- Monthly groundwater withdrawals during July 1993 (dry month) occurred at the same rate as recharge resulting in total stream depletion (no flow).
- USGS ran 10 scenarios including one that eliminated withdrawals to simulate ‘natural conditions’. In general, the scenario that combined reduced seasonal withdrawals and wastewater returns offered the best potential for recovery of low flows to ‘natural’ conditions. Other findings include:
    - Reducing withdrawals by 50% would result in a change of the probability of the stream going dry in any given year from 10% of the time to 5% of the time a relatively small impact on flow with a large impact on users.
    - A 20% increase in withdrawals increases the dry period to 15% of the time in any given year
    - Converting from on-site septic systems to sewers would increase the frequency of the stream drying from about 10% of the time to about 20% of the time.
    - Reducing groundwater withdrawals by 50% and adding 2.6 mgd return flow would result in low flows that met or exceeded low flows under ‘natural’ conditions.
    - Surface water suppliers are only allowed to pump at certain times of the year and only when minimal flow thresholds are met.

- Permitted withdrawals generally meet current demands, but hypothetical withdrawals (developed by fisheries group for minimum seasonal flows) fall short of meeting demand.

The group discussed the presentation and the value of modeling. The models offer ways to identify the causes of problems and evaluate the viability of potential solutions. There were questions about whether the reductions in withdrawals were feasible and how wastewater return flow could be accomplished. The 50% reductions in groundwater withdrawals were hypothetical, intended to assess the relationship between withdrawals and the dry periods. They are probably not realistic in terms of meeting current demand. Three towns (Wilmington, Reading, and North Reading) are exploring the creation of wastewater return sites which require high efficiency filtration and discharge to filtration beds. Other management options include tying surface withdrawals to flow rather than time, and using optimization to run pumping scenarios.

2. Next steps

The group discussed next steps. They reviewed the objectives and missions of the committee to identify work that needs to be done in addition to the current white paper review. They discussed the potential of breaking into smaller groups to address items that have not been addressed and start outlining the report for the committee which will include the white paper. The deliverables for the committee are:

1. A proposal for an interim Rhode Island instream flow standard(s) along with an assessment of need and proposed application.
2. Recommendations for developing site-specific standards, an identification of data, priority areas, and funding needs for implementation.

After discussion, the group agreed that the technical review of the white paper should be the first step and that the committee meeting should follow to discuss the overall agenda and next steps. They agreed to meet on Monday, June 2 at 10:00 am with the technical review team and again on June 9, 1:00 pm to continue the work of the committee. Preliminary reports/outlines are targeted for the end of June.

ATTACHMENT A :

Excerpts from the Report of Subcommittee B of the Connecticut Technical Management Committee

Issue 7: Recommended methods for measurement and estimations of natural flows in Connecticut waterways in order to determine standards for streamflows that will protect the ecology of the state's rivers and streams

September 5, 2002 version

Table 4. Flow statistics for "unregulated" Connecticut rivers with long term flow records. Includes median of mean daily flows for all months and the median of mean monthly flows (or FWS ABF method) in boldface type for July through September. All flows in cfm (derived from Tables 4 and 5 in Apse, 2000).

	Ten Mile River		Burlington Brook		Saugatuck River		Hubbard River		Mt Hope River		Salmon Creek		Little River		Salmon River		Pendleton Hill Brook		Sasco Brook	
October	0.31		0.62		0.45		0.40		0.45		0.65		0.53		0.42		0.52		0.45	
November	0.79		1.22		1.14		1.26		1.01		1.19		1.13		1.01		1.29		1.03	
December	1.24		1.46		2.10		1.41		1.50		1.34		1.67		1.53		2.09		1.63	
January	1.23		1.38		1.76		1.16		1.57		1.16		1.70		1.70		2.21		1.49	
February	1.38		1.54		2.00		1.21		1.78		1.46		2.00		1.90		2.44		1.76	
March	2.44		2.68		1.67		2.51		2.76		2.38		2.70		2.84		2.99		2.30	
April	2.44		2.68		2.43		3.12		2.41		2.55		2.53		2.60		2.99		2.17	
May	1.49		1.80		1.62		1.56		1.64		1.56		1.80		1.80		2.04		1.42	
June	0.75		0.90		0.67		0.55		0.66		0.82		0.87		0.78		0.87		0.58	
July	0.40	**0.53**	0.54	**0.74**	0.30	**0.49**	0.23	**0.38**	0.26	**0.43**	0.51	**0.68**	0.47	**0.59**	0.34	**0.45**	0.32	**0.51**	0.20	**0.34**
August	0.26	**0.31**	0.44	**0.55**	0.21	**0.39**	0.15	**0.24**	0.19	**0.31**	0.41	**0.43**	0.37	**0.44**	0.24	**0.34**	0.19	**0.28**	0.19	**0.39**
September	0.23	**0.28**	0.41	**0.59**	0.17	**0.31**	0.18	**0.27**	0.20	**0.25**	0.44	**0.55**	0.33	**0.44**	0.24	**0.36**	0.19	**0.32**	0.18	**0.38**

ATTACHMENT B

Proposed Long-Term Approach for Connecticut

The Subcommittee recommends that the following framework for quantifying the relationship between instream flow and habitat suitability be adopted to create and implement a long-term instream flow protocol for Connecticut's rivers and streams. This approach takes into account unique basin characteristics and provides more accurate and refined data for use in water resources planning, regulatory decision-making, and working toward achieving long-term water quantity goals. This may provide the basis for establishing future water quantity standards within the context of a balanced water allocation process.

1. Target Fish Community Regions. The first step would involve the determination of a set of target communities (Bain and Meixler, 2000) occurring in Connecticut and their spatial validity. The state would be delineated into four or five zoogeographical sub-regions. A target fish community (or communities) would be defined for each of these regions, for big and small rivers separately.

The Target Fish Community approach defines a fish community that is appropriate for a natural river in southern New England by specifying common members, the balance of abundances, species organization, and biological attributes. It uses an inference approach to summarize the ways that a current community differs from target conditions. The target community is used as a benchmark for assessing comparability and also to identify the nature of departures. It serves as a target for river enhancements and as an endpoint for evaluating program progress.

The theoretical basis of the target community concept is similar to that cited for the development of Index of Biological Integrity (IBI)-type approaches, i.e., the operational definition of biological integrity first developed by Karr and Dudley (1981), the definition of community (i.e., assemblage) attributes, including their proportions and membership, the assignment of fish species to various guilds (e.g., macrohabitat generalists and fluvial specialists), and the use of least impacted reference condition (similar rivers) to define "natural." The target community approach is consistent with Clean Water Act goals to restore and maintain the physical, chemical and biological integrity of the Nation's Waters.

Target Fish Communities have also been developed by State and Federal interagency teams for the Ipswich in Massachusetts and the Lamprey River in New Hampshire. Plans are underway in 2002 to develop Target Fish Communities for the Charles and Housatonic Rivers as part of the Massachusetts Executive Office Environmental Affairs watershed planning cycle. It is identified in the Massachusetts Water Resources Commissions Stressed Basin Report as a key way to determine habitat impairment.

2. <u>Habitat selection criteria</u>. For every community, define the habitat selection criteria of the dominating species and life stages, using a combination of electrofishing with underwater and on-shore observations. These criteria would be developed for each season in good quality river reaches and would comprise a regionally valid set.

3. <u>Fish Habitat Regions.</u> Next follows the delineation of the state into hydro morphological regions based on available hydrological, geological, land form and land use data. Subsequently, fish community- and hydromorphological regions are overlaid creating fish habitat regions that define specific physical settings and corresponding fish fauna as a product. For each fish habitat region one or two representative watersheds are selected. What follows is a stratified census, or inventory, of low-flow mesohabitats for these watersheds. Small rivers can be mapped in river-hike surveys and larger ones combining aerial videography with on-the-ground survey.

4. <u>Habitat model.</u> Development of a habitat-flow relationship for each watershed. Following the rigorous approach developed on the Quinebaug River, select a number of representative sites to be mapped at various flow conditions and then establish the MesoHABSIM model.

5. <u>Habitographs</u> Based on habitat time-series analysis (including reproduction of “pre-colonial or unregulated” hydrographs) and the “continuous-under-threshold” technique developed in France determine habitat thresholds, (specifically, the lowest allowable and the highest probable level of habitat). This step would produce seasonal habitat time series, habitat duration curves and, finally, continuous under-threshold duration curves. Such target habitographs would be generated for each fish habitat region.

6. <u>Application in individual cases:</u> To determine the deviation from target habitograph for any watershed in the region, habitat time series are converted to hydrological time series and compared with present hydrographs applying the Range of Variability Approach developed by the Nature Conservancy. This technique describes natural range of inter- and intra-annual hydrograph fluctuations, as determined by the statistical analysis of historical hydrographs. The sole use of historical hydrographs presents problems, however, due to landscape changes and historical impacts ,which predate the installation of a particular gauge. As a result target hydrographs should be used.

Because the target habitograph takes into account the interplay of flow and habitat structure the improvement in impacted streams could be achieved in two ways: either by changing the flow scheme or by optimization of habitat structure. Therefore to maximize the amount of water used for other than ecological purposes the potential for improvement of habitat structure by, for example channel restoration or dam removals can be utilized first. The watershed scale of this approach would also allow for analysis of impact mitigation by replacement measures i.e. trades-off of the habitats in different locations.

7. <u>Impact simulator.</u> To effectively handle all sets of options and perform adequate

optimization it is necessary to provide a Windows based computer software, that could be used by resource managers and users. This quantitative simulation package should build upon MesoHABSIM and serve as a comprehensive tool for analyzing the impact of various resource-use scenarios. It will predict the habitat quantity and quality for definable portions of the river ranging from individual reaches up to an entire watershed. Furthermore, it should allow to integrate the habitographs with water quality, temperature, life history, and climatic change issues and develop catalogs of integrative management measures for each watershed in the region.